CLAIMS

We claim:

1. A gasket comprising

an inner periphery and

at least two windings of at least one porous expanded PTFE tape and alternating windings of at least one substantially air impermeable layer wound in an increasing distance around the inner periphery,

wherein sequential expanded PTFE tape windings are joined by the alternating windings of the at least one substantially air impermeable layer.

2. The gasket of claim 1, wherein the gasket is circular.

3. The gasket of claim 1, wherein the gasket is non-circular.

4. The gasket of claim 1, wherein the gasket is substantially square, rectangular, or elliptical.

5. The gasket of claim 1, wherein the tape comprises upper and lower tape surfaces that define upper and lower gasket surfaces.

6. The gasket of claim 5, wherein the upper and lower tape surfaces and the plane of expansion of the at least one expanded PTFE tape are substantially in the x-y plane of the gasket.

7. The gasket of claim 5, wherein the gasket when uncompressed has a substantially uniform thickness across upper and lower gasket surfaces.

8. The gasket of claim 1, wherein the ePTFE has a density of less than 1.8 g/cc.

9. The gasket of claim 1, wherein the ePTFE has a density of less than 1.2 g/cc.

10. The gasket of claim 1, wherein the ePTFE has a density of less than 1.0 g/cc.

11. The gasket of claim 1, wherein at least a portion of the ePTFE tape is monoaxially expanded.

12. The gasket of claim 1, wherein at least a portion of the ePTFE tape is biaxially expanded.

13. The gasket of claim 1, wherein at least a portion of the ePTFE tape is multiaxially expanded.

14. The gasket of claim 1, wherein the ePTFE tape is a multilayer laminate.

15. The gasket of claim 14, wherein at least one expanded polytetrafluoroethylene (ePTFE) layer comprises at least one filler.

16. The gasket of claim 15, wherein the at least one filler comprises at least one material selected from metals, semi-metals, metal oxides, glasses, ceramics, activated carbons, carbon blacks, and polymeric resins.

17. The gasket of claim 15, wherein the at least one filler comprises at least one material selected from silica, barium sulfate, graphite, and glass beads.

18. The gasket of claim 1, wherein the at least one substantially air impermeable layer comprises a fluoropolymer.

19. The gasket of claim 1, wherein the at least one substantially air impermeable layer comprises a melt processable fluoropolymer.

20. The gasket of claim 1, wherein the at least one substantially air impermeable layer comprises tetrafluoroethylene/perfluoroalkyl vinyl ether copolymer (PFA).

21. The gasket of claim 1, wherein the at least one substantially air impermeable layer comprises tetrafluoroethylene/hexafluoropropylene copolymer (FEP).

22. The gasket of claim 1, wherein the at least one substantially air impermeable layer comprises polytetrafluoroethylene (PTFE), densified expanded polytetrafluoroethylene, or both.

23. The gasket of claim 1, wherein the at least one substantially air impermeable layer comprises at least one of PFA or FEP in combination with ePTFE.

24. The gasket of claim 5, wherein the at least one substantially air impermeable layer extends substantially completely between upper and lower tape surfaces.

25. The gasket of claim 5, wherein the at least one substantially air impermeable layer extends beyond upper and lower tape surfaces.

26. The gasket of claim 1, wherein the at least one substantially air impermeable layer has a permeability to air less than the expanded polytetrafluoroethylene (ePTFE).

27. A gasket comprising

an inner diameter and

at least two joined spirals comprising alternating rotations of at least one porous multilayer expanded PTFE tape and at least one substantially air impermeable layer rotating in an increasing distance around the inner diameter,

wherein the expanded PTFE tape has upper and lower tape layers, and side surfaces extending between the upper and lower tapes layers,

wherein the alternating rotations of the at least one expanded PTFE tape and at least one substantially air impermeable layer are joined at the expanded PTFE tape side surfaces by the at least one substantially air impermeable layer, and

wherein the upper and lower tape layers and the plane of expansion of the at least one expanded PTFE tape are in the x-y plane of the gasket.

28. The gasket of claim 27, wherein the upper and lower tape layers define upper and lower gasket surfaces.

29. The gasket of claim 27, wherein the gasket when uncompressed has a substantially uniform thickness across upper and lower gasket surfaces.

30. The gasket of claim 27 wherein the ePTFE has a density of less than 1.8 g/cc.

31. The gasket of claim 27, wherein the ePTFE has a density of less than 1.2 g/cc.

32. The gasket of claim 27, wherein the ePTFE has a density of less than 1.0 g/cc.

33. The gasket of claim 27, wherein at least a portion of the ePTFE tape is monoaxially expanded.

34. The gasket of claim 27, wherein at least a portion of the ePTFE tape is biaxially expanded.

35. The gasket of claim 27, wherein at least a portion of the ePTFE tape is multiaxially expanded.

36. The gasket of claim 27, wherein at least one expanded polytetrafluoroethylene (ePTFE) layer comprises at least one filler.

37. The gasket of claim 36, wherein the at least one filler comprises at least one material selected from metals, semi-metals, metal oxides, glasses, ceramics, activated carbons, carbon blacks, and polymeric resins.

38. The gasket of claim 36, wherein the at least one filler comprises at least one material selected from silica, barium sulfate, graphite, and glass beads.

39. The gasket of claim 27, wherein the at least one substantially air impermeable layer comprises a fluoropolymer.

40. The gasket of claim 27, wherein the at least one substantially air impermeable layer comprises a melt processable fluoropolymer.

41. The gasket of claim 27, wherein the at least one substantially air impermeable layer comprises tetrafluoroethylene/perfluoroalkyl vinyl ether copolymer (PFA).

42. The gasket of claim 27, wherein the at least one substantially air impermeable layer comprises tetrafluoroethylene/hexafluoropropylene copolymer (FEP).

43. The gasket of claim 27, wherein the at least one substantially air impermeable layer comprises polytetrafluoroethylene (PTFE), densified expanded polytetrafluoroethylene, or both.

44. The gasket of claim 27, wherein the at least one substantially air impermeable layer comprises at least one of PFA or FEP in combination with ePTFE.

45. The gasket of claim 27, wherein the at least one substantially air impermeable layer extends substantially completely between upper and lower tape layers.

46. The gasket of claim 27, wherein the at least one substantially air impermeable layer extends beyond upper and lower tape layers.

47. The gasket of claim 27, wherein the at least one substantially air impermeable layer has a permeability to air less than the expanded polytetrafluoroethylene (ePTFE).

48. A method of forming a gasket comprising joined spirals of ePTFE tape and a fluoropolymer layer comprising the steps of:

a. providing a length of a porous multilayered expanded PTFE tape having upper and lower tape layers, and side surfaces extending the length of the tape between the upper and lower layers, wherein the plane of expansion of the expanded PTFE is in the x-y plane of the gasket;

b. providing a melt processable fluoropolymer comprising at least one of FEP and PFA;

c. forming a fluoropolymer layer on the two ePTFE tape side surfaces comprising the steps of contacting the ePTFE side surfaces and the melt processable fluoropolymer, heating the expanded PTFE tape side surfaces and the melt processable fluoropolymer above the melt temperature of the ePTFE and the fluoropolymer, and applying pressure to weld the heated expanded PTFE side surfaces and fluoropolymer; and

d. forming alternating rotations of the expanded PTFE tape and fluoropolymer at an increasing distance around a die outer diameter comprising the steps of winding the expanded PTFE tape comprising the fluoropolymer layers around a die for a complete rotation, winding and applying heat at a juncture of two

fluoropolymer layers above the fluoropolymer melt temperature for subsequent rotations, contacting the heated fluoropolymer, and applying pressure to fuse the two fluoropolymer layers and join rotations of the expanded PTFE along tape side surfaces

49. The method of claim 48, wherein the step of contacting the ePTFE tape and the melt processable fluoropolymer comprises the step of coating at least one side surface of the ePTFE tape along the length of the tape with the melt processable fluoropolymer.

50. The method of claim 48, wherein the density of the ePTFE is less than 1.8 g/cc.

51. The method of claim 48, wherein the density of the ePTFE is less than 1.2 g/cc.

52. The method of claim 48, wherein the upper and lower tape layers correspond to upper and lower gasket surfaces.

53. The method of claim 48, wherein the gasket is uncompressed and has a substantially uniform thickness across upper and lower gasket surfaces.

54. The method of claim 48, wherein the gasket is circular.

55. The method of claim 48, wherein the gasket is non-circular.

56. A method comprising the steps of:

providing at least one porous ePTFE tape;

providing at least one material capable of forming a substantially air impermeable layer;

coiling the at least one ePTFE tape and the at least one material capable of forming a substantially air impermeable layer to form alternating windings of the ePTFE tape and the at least one material capable of forming a substantially air impermeable layer; and

joining the windings to form a unitary structure comprising an inner periphery and alternating windings of porous ePTFE and at least one substantially air impermeable layer around the inner periphery.

57. The method of claim 56, wherein the alternating windings of ePTFE tape and at least one material capable of forming a substantially air

impermeable layer are coiled at increasing distances around the inner periphery.

58. The method of claim 56, wherein the step of contacting the ePTFE tape and the melt processable fluoropolymer comprises the step of coating at least one side surface of the ePTFE tape along the length of the tape with the melt processable fluoropolymer.

59. The method of claim 56, wherein the density of the ePTFE is less than 1.8 g/cc.

60. The method of claim 56, wherein the density of the ePTFE is less than 1.2 g/cc.

61. The method of claim 56, wherein the ePTFE comprises upper and lower tape surfaces.

62. The method of claim 61, wherein the unitary structure comprises a gasket.

63. The method of claim 62, wherein the upper and lower tape surfaces correspond to upper and lower gasket surfaces.

64. The method of claim 61, wherein the ePTFE comprises side surfaces extending between upper and lower tape surfaces.

65. The method of claim 62, wherein the ePTFE tape windings are aligned along tape side surfaces.

66. The method of claim 61, wherein the plane of expansion of the ePTFE is in the x-y plane of the at least one ePTFE tape.

67. The method of claim 62, wherein the gasket is uncompressed and has a substantially uniform thickness across the upper and lower gasket surfaces.

68. The method of claim 56, wherein the at least one material capable of forming a substantially air impermeable layer is a fluoropolymer.

69. The method of claim 63, wherein the fluoropolymer comprises PFA.

70. The method of claim 63, wherein the fluoropolymer comprises FEP.

71. The method of claim 61, wherein the gasket is circular.

72. The method of claim 61, wherein the gasket is non-circular.

73. A method of forming a gasket comprising windings of ePTFE tape joined by alternating windings of a fluoropolymer layer comprising the steps of:

a. providing a length of a porous e PTFE tape;
b. providing a melt processable fluoropolymer;
c. forming at least one fluoropolymer layer along the length of the ePTFE tape comprising the steps of contacting the ePTFE and the melt processable fluoropolymer, heating the expanded PTFE tape and the melt processable fluoropolymer above the melt temperature of the ePTFE and the fluoropolymer, and applying pressure to weld the heated ePTFE tape and fluoropolymer; and
d. forming alternating windings of the ePTFE tape and fluoropolymer around a form defining the inner periphery of the gasket comprising the steps of winding the ePTFE tape comprising at least one fluoropolymer layer around a form and applying heat at a juncture of two windings above the fluoropolymer melt temperature, contacting the tape windings, and applying pressure to join sequential windings of the ePTFE along the length of the tape forming at least one fluoropolymer layer between the ePTFE windings.

74. The method of claim 73 wherein the ePTFE tape has upper and lower tape layers and two tape side surfaces extending the length of the tape and at least one fluoropolymer layer is formed on each tape side surface.

75. The method of claim 73, wherein the plane of expansion of the ePTFE is in the x-y plane of the gasket.

76. The method of claim 73, wherein the step of applying heat at the juncture of two winding comprises applying heat at the juncture of the two fluoropolymer layers on the ePTFE tape side surfaces.

77. The method of claim 73, wherein the step of applying pressure comprises applying pressure to the ePTFE tape and the at least one fluoropolymer layer.

78. The method of claim 73, wherein the form defining the inner periphery of a gasket is a die.

79. The method of claim 73, wherein the gasket is circular.

80. The method of claim 73, wherein the gasket is non-circular.

81. The method of claim 73, wherein the fluoropolymer comprises at least one of FEP and PFA.